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(54) Method for preparing a nutriment, nutriment, method of dispensing a nutriment

(57) The invention is concerned with a method of administering a nutriment to an organism, such as cattle, by directly or indirectly adding it from a storage bin into the transport line for a product, like drinking water or porridge food, to be consumend by the organism, extending to one or more tap points. The invention is also concerned with a method for preparing a nutriment and with an at least substantially saturated aqueous nutriment.

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Description

[0001] The invention is at the field of nutriments, such as food supplements, particularly for cattle, such as horned cattle, among which dairy cows or calves, goats, sheep, lambs, chicken, chicks, pigs among which sows and piglets, horses, rabbits, etc., or different mammals or birds or under water animals such as fish or crustaceans.

[0002] EP-A-0 454 221 discloses a method for preparing an aqueous food supplement for cattle and the thus prepared food supplement. Micro and macro elements are dissolved in water in the presence of phosphoric acid until a substantially saturated solution is obtained that can be added to the drinking water of the cattle. EP-A-0 454 221 and EP-B-0 454 221 and the priority application NL-A-9000996 provide a relevant technical background for the present invention and have several objects in common with it and are therefor enclosed in here by reference.

[0003] According to one aspect the object of the invention is a nutriment that can be administered conveniently in a preferably predetermined dosing, and this preferably such that the nutriment is consumed as equal as possible.

[0004] According to one aspect the object of the invention is a nutriment that can be dissolved in a fluid, such as drinking water or fluid food, or can be mixed therewith without or with minimum formation of precipitates.

[0005] According to one aspect the object of the invention is a nutriment that is at least substantially free of the metabolism unnecessary loading elements, such as unwanted anions like chlorides and sulfates, or the concentration thereof is as low as possible.

[0006] According to one aspect the object of the invention is a nutriment that can be conveniently prepared.

[0007] According to one aspect the object of the invention is a stable nutriment such that it has e.g. a long shelve life.

[0008] According to one aspect the object of the invention is the lowering of the exhaust by the organism that uses the nutriment of compounds that are harmful to the environment.

[0009] According to one aspect the object of the invention is increasing the productivity of the organism that uses the nutriment.

[0010] According to one aspect the object of the invention is to increase the group of compounds among which a selection can be made to prepare the nutriment.

[0011] According to one aspect the object of the invention is to prepare an aqueous nutriment with one or more dissolved nutricious compounds from substances that are little or not water soluble.

[0012] According to one aspect the object of the invention is a nutriment that harms the taste of orally administration as little as possible.

[0013] According to one aspect the object of the invention is a nutriment composed of or containing one or more vitamins.

[0014] According to one aspect the object of the invention is a nutriment that can be prepared and/or administered safely.

[0015] According to one aspect the object of the invention is a combination of two or more of the above aspects.

[0016] The invention is further illustrated by non-limiting embodiments, that also pay attention to other objects and advantages of the invention.

[0017] According to a first example the nutriment is from a storage bin administered in a tap water line wherein a pressure head of preferably at least 0.5 bar prevails. This tap water line, that can be situated within a stable, is e.g. connected to the common tap water distribution line, but can also be connected to a local tap water installation that gets the drinking water from a nearby (e.g. at the own site) underground well. From the dispensing point of the nutriment the line extends, possibly through branches, to one or more distant tap or consumption points, where the animals can drink from the drinking water. The metering device is connected to an electronic control unit that takes care of adding a predetermined amount of nutriment per unit of water flowing through the line. Thus it flows with the tap water through the tap water line to the dispensing points, wherein the concentration of the nutriment can be virtually equal and homogeneous at each dispensing point. In this way the required metering equipment can be kept to a minimum, while despite of this an individual administration of the nutriment for a group of animals can be provided since the tap water needs of an individual, particularly of a dairy cow, corresponds to its needs for the nutriment.

[0018] By way of alternative the nutriment can be administered from a storage bin into a drinking water reservoir, e.g. a bin that is in free connection with the atmosphere above its water level, such that it flows from there, e.g. hydraustatically determined, through the tap water line with possible branches to one or more dispensing points, such as drinking troughs that are continuously in open communication with the reservoir and filled from a location below the water level. The water level in the drinking water reservoir can be levelled automatically by e.g. a floating valve with which a tap water line connected to the common water distribution system or a local drinking water well is kept closed.

[0019] By way of further alternative the nutriment can be administered from a storage bin into a container or line filled with another fluid nutriment, e.g. a viscous nutriment such as so called porridge food for pigs, to flow through a line together with said liquid to a tap point, such as a feed trough in a stable. Also here an individual administartion for a group of animals can be provided easily with a central, thus non-individual, administration.

[0020] Thus the nutriment, preferably mixed with tap water or another liquid, flows over a predetermined dis-

tance of e.g. at least two or more meters through a mostly relatively narrow tube to the one or more tap points, such as drinking nipples or drinking bins or feed trough, wherein the thus diluted nutriment can pass one or more valves in the line. The nutriment is continuously for long periods, such as at least a month, preferably at least substantially for the whole year, individually administered in this way. Thus, this nutriment froms an at least almost daily part of the food.

[0021] The tap points can e.g. be all, or at least substantially all tap points in a stable or several closely adjacent stables and have preferably enough spacing such that two or more individuals can use at the same moment a relevant tap point without intefering each other. If the animals are housed in sheds, each shed can be provided with such a tap point.

[0022] The nutriment can be a solid or liquid in the storage bin. In both cases the nutriment contains preferably one or more elements selected from the group comprising at least Ca, Mg, Zn, Cu, Mn, Na, Co, Se, I.

[0023] If liquid, at least a part of one or more of those elements, preferably at least one, more preferably at least two, among which e.g. Cu and Zn, most preferably at least three, among which e.g. Mn, Cu and Zn, elements, preferably from the sub group Ca, Mg, Mn, Zn, en Cu, is dissolved in water from a little or not water soluble substance thereof, such as oxides of carbonates, with the aid of a convenient acid, such as phosphoric acid or an organic acid, such that from said nutrients one or more proper water soluble reaction products are provided that do not add the metabolism loading byproducts, such as undesired anions such as chlorides or sulfates. The liquid nutriment is preferably an at least substantially saturated solution, particularly at elast saturated with one or more of those elements.

[0024] If solid, the nutriment is preferably properly water soluble. In that case the nutriment consists e.g. of a dry mixture of one or more nutrients from proper water soluble salts, selected from the group containing at least Ca, Mg, Zn, Cu, Mn, Na, Co, Se, I. Preferably at least part of the preferably at least one, more preferably at least two among which e.g. Cu and Zn, moste preferably at least three, among which e.g. Mn, Zn and Cu, elements containing dry substances, preferably from the sub group of Ca, Mg, Mn, Zn and Cu containing dry substances, consist of salts of phosphoric acid or an organic acid. Preferably, one or more of those salts is provided by reaction of those nutrients in a littel or not water soluble form, such as in the form of oxides and/or carbonates, with a convenient acid, such as phosphoric acid or an organic acid, such that of those nutrients one or more good water soluble reaction products are provided that provide at least substantially no the metabolism loading byproducts, such as undesired anions such as chlorides of sulfates.

[0025] When administering the solid nutriment, it can be directly administered, such that it dissolves in the line. By way of alternative the dissolving can take place first, followed by administering into the line.

[0026] Preferably all elements from the group Mg, Mn, Zn, Cu, contained by the nutriment, are at least partly either dissolved in water with the aid of an organic acid of phosphoric acid or at least partly present as dry substance as good water soluble salts of an organic acid of phosphoric acid. This is also true for the element Ca, if present.

[0027] It is feasible, to administer from different storage bins, wherein the contents of each storage bin can be a different composition, such that by at least substantially simultaneous administering from one or more of those bins, the desired composition of the nutriment is made; e.g. a bin with exclusively magnesium compound (s), a bin with exclusively manganese compound(s), a bin with exclusively copper compund(s), a bin with exclusively zinc compound(s) and a bin with exclusively one or more micro elements such as iodine, selene or cobalt. It is also possible to provide two or more storage bins from which at least one contains a pre-mixture of e.g. two or more of the above mentioned elements Ca, Mg, Mn, Zn, Cu, Na and possibly other desired elements. It is also feasible, that at least one of the storage bins contains the one or more nutrients in dissolved state and at least one of the storage bins contains the one or more nutrients in solid state. In this way the mutual ratio of the nutrients to be administered can be adapted at desire at the local site.

[0028] The administration is preferably such that a strong dilution is provided, preferably an at least 100-fold, more preferably an at least 500-fold, moste preferably an at least 1000-fold dilution of the nurtiment. Preferably the administration is adjusted such that the individual gets enough but not too much of the nutriment by consuming the liquid to which the nutriment is added.

[0029] The nutriment, e.g. on the basis of organic acid, that is illustrated further on, can be administered to the individual in the above described manner. By way of alternative the nutriment as described in one of the above identified patent publications can be administered to the individual in the above described manner. Concerning the composition of this nutriment and the menner of preparing it, those patent publications are enclosed here by reference. However, the nutriment can also be differently administered to the individual, such as by spreading (e.g. spraying) over the roughage or by directly administering into the drinking troughs in the stable.

[0030] Different compounds, such as choline (vitamin B4), e.g. in the state of choline chloride, can be adminstered to the individual in the above described sense; particularly nutrients that are or can be an at least almost daily part of the food.

[0031] The inventors have discovered that, dependent on the type of nutiment and in particular with nutriments on the basis of the above cited patent publications, when administering the nutriment into the liquid line according to the invention, the yield of the nutriment

at the tap point does not have to be equal to the initial (central) administration upstream. This seems particularly the case when administrating into the tap water line.

[0032] It was surprisingly found out that such a phenomenon is present in an at least generally smaller amount or lacks completely when in combination with administering the nutriment in drinking water no or at least substantially no one or more phosphate ions containing one or more compounds arrive into the drinking water, particularly wherein those phosphore ions come available in the drinking water to make another binding, or in the alternative that so much of that compound arrives in the drinking water, that the phosphorous ions in the drinking water form one or more good water solubl compounds and/or in relation to administering the nutriment into the drinking water, phosphorous compounds arriving into the drinking water, remain.

[0033] This can be exemplified as follows:

Example 1

[0034] It was found out that with an at least almost precipitate free almost saturated aqueous food supplement with the following elements: Mg, Mn, Zn, Cu and 300 moles phosphates per 100 kg food supplement and a pH of 2.5 at a dosing rate of 2 gr/l tap water (groundwater, pumped in the neighbourhood of Wolvega, Netherlands, that is used on a daily basis as drinking water for piglets after processing in a common de-ironing device), the mean yield of elements at the tap point, measured during a five times twenty four hours' period, is less than 80%, wherein the tap water flows with a temperature of about 10°C and a pressure of about 2 bar from the administration point of the food supplement over a distance of five meters through a water line, common for a pig farm, before reaching the tap point, while the mean through flow speed measures 1 l/hour, wherein the tap water stand stil during 70% of the time, to simulate the drinking behaviour of the pigs. Investigation of the inner wall of the water line between the administering point and the tap point yields that a precipitation has fromed on it, containing magnesium, zinc and copper containing phosphate compounds. The inventors were surprised by this precipitation formation, since it was discovered earlier on that the nutriment can be strongly diluted without precipitation formation.

Example 2

[0035] By repeating the test, but also adding an almost saturated solution of phosphoric acid (e.g. 73-75% phosphoric acid solution) in the same amount and at the same location as and simultaneous with the food supplement, while all the other circumstances remained the same, the yield of the elements at the tap point increased to at least almost 100%. The inner wall of the line showed hardly any precipitation of phosphate compounds.

Example 3

[0036] By repeating the test again, but now with limitation of the amount of phosphate in the at least almost precipitation free, almost saturated food supplement to 20 moles, preferably 10 moles per 100 kg food supplement at the most, while replacing the phosphate groups further by organic acid groups, such that the pH measured 6.0 to the most, while keeping the other circumstances unaltered, the yield of the elements at the tap point again seemed to measure at least almost 100%. Again, the inner wall of the line showed hardly or no precipitation of phosphate compounds.

[0037] It was found out that if the same food supplement of example 1 is administered into porridge food, the yield of the elements at the tap point (feed trough) measures almost 100%, despite that that porridge food contains a substantial amount of tap water (such as groundwater).

[0038] A nutriment according to the invention can be prepared as follows:

[0039] In demi-water one or more acids, preferably selected from the group containing phosphoric acid and organic acids, mixed with one or more substances to yield one or more dissolved elements, wherein those elements are selected from the group containing at least calcium, phosphorous, magnesium, manganese, zinc, copper, sodium, cobalt, iodine and selene, wherein those substances are selected from the group containing at least oxides, phosphates and carbonates. Said organic acids can be selected from the group of at least substantially good water soluble organic acids, such as hydrogen carbon acid, acetic acid, ethane carbon acid, butane carbon acid, malonic acid, maleic acid, lactic acid en citric acid. Preferably, mixing takes place such that an at least substantially saturated solution is provided.

[0040] Thus, an in water dissolved or in water good soluble, and thus by the organism good accepted, nutriment can be prepared from substances that are little or not soluble in water.

[0041] According to a prefered embodiment the oxides are mixed with water in the precense of acetic acid and/or the carbonates are mixed in the precense of hydrogene carbon acid.

[0042] According to another prefered embodiment the elements are dissolved in a mixture of different acids, such that of each elements a concentration can be provided that is as high as possible. In this repsect it is preferable, that the mutual mixing ratio of the acids is selected such that the concentration of all elements in the solution is optimised. E.g. the elements Mg, Zn and/or Mn are dissolved with acetic acid, while Cu and, or, respectively, Mn are dissolved with hydrogene carbon acid. The hydrogene carbon acid and/or acetic acid can be completely or partly replaced by ethane carbon acid.

[0043] Pre-mixture can possibly be made, e.g. the one with exclusively the one or more substances dissolved in the one acid and the other with exclusively the

one or more substances dissolved in another acid, that are subsequently brought together. It is also feasible to use for each desired element a seperate pre-mixture such that the mutual mixing ration of the elements can be adjusted rather easily each time, e.g. to be able to prepare nutriments adjusted to different target groups shortly after each other.

[0044] The nutriment can contain organic and/or anorganic growth stimulating compounds, such as micro elements, e.g. selene, cobalt, iodine and vitamins. Different salts, preferably good soluble in water, can be added to the nutriment, such as MgCl, or NaCl, if desired.

[0045] The nutriment can at least substantially prepared into a substantial saturated solution from the following substances, wherein siad solution is preferably substantially saturated with said one or more food elements: 0-25 wt% hydrogene carbon acid (98%); 0-35 wt% acetic acid (100%); 0-35 wt% ethane carbon acid (99%); oxides or phosphates of carbonates from one or more food elements from the following group: manganese, magnesium, zinc, copper. In water soluble compounds can be added thereto of one or more elements from the group: sodium, selene, iodine, cobalt; blanse water, such that within the nutriment the ratio of the food elements can be as follows:

magnesium	0,1-8 gew%
zinc	0,1-8 gew%
manganese	0,1-8 gew%
copper	0,1-8 gew%
sodium	0,05-3 gew%
cobalt	1-200 ppm
selene	1-200 ppm
iodine	1-400 ppm.

[0046] The chemical compounds, particularly the oxides, phosphates and carbobates, react with the present acid to yield in water soluble salts of said acid. Depending on the way of preparation, a predetermined amount of free acid can be present in the completed nutriment, and said amount varies preferably between 5 and 20 wt%. A part of said free acid is nutralised by adding Na as NaOh. The pH of this nutriment ranges preferably below 7.0, more preferably below about 6.0, and is preferably higher than about 2.0, more preferably higher than about 3.0 and ranges most preferably between at least about 3.25 and at least about 4.75. Cobalt can be added as cobalt-sulfate. Selene can be added as sodiumselenite. Iodine can be added as sodiumiodate.

[0047] Furthermore, with the above described nutriment based on organic acids the same advantages are provided as described in the above cited patent publications concerning a nutriment based on phosphoric acid. The concentrations, e.g. per 100 kg nutriment, indicated in said publications of the elements manganese, magnesium, copper, zinc, cobalt, selene, iodine sodium and the starting substances therefor for the preparation of the nutriment, can also be applicable to the present nutriment on the basis of organic acid. In that respect those patent publications are therefore enclosed in here by reference.

[0048] Thus, the invention is concerned with a preferably liquid nutriment prepared with one or more organic acids with preferably dissolved desired food elements, and the method of preparing said nutriment. The invention is also concerned with an attractive manner of continuously administering during a relatively long time a predetermined individual dose of the nutriment to a group of individuals by central administering in a liquid tubing, such as the water line system or a porridge food line system.

[0049] It is appreciated that with the little or not in water soluble phosphate compounds, particularly the secundair and tertiair compounds are meant. It is furthermore appreciated that preferably the little of not in water soluble substances are dissolved in the water acidified with one or more of said acids. Preferably pure substances are used as raw materials, with a purity such that they are adapted as animal food or human consumption, such that as little as possible, or at least substantially no, undesired substances are added to the nutriment. Preferably the nutriment is prepared wherein at least one of the added substances, more preferably all those substances, adds two at the most, preferably only one of the desired elements, selected from the group Ca, Mg, Zn, Cu, Mn. In this way a highes possible purity and flexibility of the composition can be provided. The substances can be brought in contact with the dissolving agent simultaneously or subsequently, and this is also possible for some substances simultaneously and some other at a later moment of time.

Claims

1. Method of administering a nutriment to an organism, such as cattle, by directly or indirectly adding it from a storage bin into the transport line for a product, like drinking water or porridge food, to be consumend by the organism, extending to one or more tap points.

2. Method according to claim 1, wherein said adding takes place at a central location in the transport line, and/or during adding the concentration of the nutriment is diluted at least 100, preferably at least 500, most preferably at least 1000 times, before being accepted by the organism.

3. Method according to claim 1 or 2, wherein the adding is carried out with the aid of motoric dispensing means, particularly such that the daily needs of the organism for said nutriment is added at least substantially equally distributed during the day, e.g. in

a predetermined quantity of volume or weight per quantity water taken up from the line by the organism, preferably such that the concentration of the nutriment in the water within the transport line is at least substantially constant, e.g. by adding in dependency from the water flow through the transport line or the water supply to said transport line, and this preferably each time at least substantially simultaneously with siad water flow.

4. Method according to claim 1, 2 or 3, using the nutriment according to any of claims 9 or 10.

5. Method for preparing a nutriment wherein water and at least one substance are used for preparing a preferably aqueous solution of micro and/or macro elements wherein said substance is an at least substantial little or no water soluble substance, such as carbonate, phosphate (particularly secundair or tertiair), or oxide compound, and wherein the water is acidified with an organic and/or anorganic acid, preferably in such an amount, that said substance is at least substantially dissolved.

6. Method according to claim 5, wherein by adding to the water at least one of said substances, at least one of the following elements from the group dissolves: Mg, Mn, Zn, Cu, Ca.

7. Method acoording to claim 5 or 6, wherein measurements are taken such that the water contains one or more of the following: acetic acid, hydrogene carbon acid, ethane carbon acid, phosphoric acid.

8. Method according to claim 5, 6 or 7, wherein at least one technically pure nutrient substance is used.

9. At least substantially saturated aqueous nutriment, particularly provided with the method according to any of claims 5-8, containing one or-more elements from the group Mg, Mn, Zn, Cu, Ca, possibly in combination with one or more of the elements from the group Se, I, Co, Na, Cl and with one or more of the following: acetic acid, hydrogene carbon acid, etahne carbon acid, phosphoric acid and with a pH below 7.0, preferably below about 6.0 and preferably higher than 2.0, more preferably higher than about 3.0 and most preferably between at least about 3.25 and at least about 4.75.

10. Nutriment according to claim 9, wherein it contains the following: magnesium 0,1-8 gew%; zinc 0,1-8 gew%; manganese 0,1-8 gew%; copper 0,1-8 gew%; sodium 0,05-3 gew%; cobalt 1-200 ppm; selene 1-200 ppm; iodine 1-400 ppm.

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EUROPEAN SEARCH REPORT

Application Number
EP 99 20 4139

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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Y	* page 3, line 45 - page 4, line 9 *	1-4	
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A	EP 0 659 337 A (VOGL GERHARD) 28 June 1995 (1995-06-28) * claim 1 * * figure 1 *	1-3	
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	21 March 2000	Dekeirel, M

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

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